

### Remarks

In the Final Office Action of 15 October 2008, Claims 1-24 were pending with no claims yet allowed. Applicant respectfully requests reconsideration for the reasons below.

### Amendments to the Claims

Claims 2, 4, 6, 10, 12, 14, 18, 20, and 22 are currently amended for clarity to delete the recitation of *further* and to add the recitation of *to adjust*. Claims 10 and 12 are also amended to delete the recitation of *the first stage of fuel combustion*.

### 35 U.S.C. § 112 Written Description Rejections

The Office maintains its rejection of Claims 1-24 under §112, first paragraph, for allegedly failing to comply with the written description requirement. Applicant respectfully requests favorable reconsideration for the reasons below.

### The Specification Includes An Actual Reduction to Practice

As the Office is aware, MPEP 2163 provides that “[p]ossession may be shown in a variety of ways including *description of an actual reduction to practice*” (emphasis added). Applicant directs the Office’s attention to page 10, line 21-page 11, line 1 of the application as filed, discussing various preferred embodiments of the invention using micro- and macro-stage for adjustment. Applicant also directs the Office’s attention to the examples on pages 13 and 14 of the application as filed showing three actual reductions to practice employing macro-staging to achieve benefits of the instant invention. In these reductions to practice, load parameters are given as well as parameters for macro-staging. For example, for shallow staging over-fired air ports contained a cooling flow of around 10% of the total air; for mid staging, over-fired air ports made up approximately 20% of the total air flow; and for deep staging, over-fired air ports made up approximately 30% of the total air flow.

Applicant also notes that reducing environments of the invention are described on page 12, lines 1-11. As described, a “reducing environment is one where the ratio of the concentrations of reducing radicals to oxidizing radicals is greater than about 1; more specifically, the ratio of the concentrations of H radicals to O radicals is greater than about 1.” Applicant notes that a “better reducing environment is one where the ratio of the concentrations

of reducing radicals to oxidizing radicals is greater than about 10; more specifically, the ratio of the concentrations of H radicals to O radicals is greater than about 10." Applicant also sets forth that "an adequate reducing environment according to the present invention is one that will reduce SO<sub>3</sub> to SO<sub>2</sub> in less than about 2 seconds, more preferably, in less than about 0.5 seconds."

Applicant also discloses temperatures necessary to create an adequate reducing environment in certain embodiments, e.g., "a reducing environment can be achieved when the first stage flue gas temperature is greater than or equal to 900 Kelvin (1160 degrees F), more preferably greater than about 1255 K (1800 degrees F), even more preferably greater than about 1650 K (2500 degrees F)."

Applicant also discloses on page 11, lines 4-6, that for typical precipitators, SO<sub>3</sub> levels between about 10 to about 15 ppm (by volume) in the exhaust is desirable for best efficiency.

Applicant respectfully believes that the reductions to practice, as well as additional parameters set forth in the specification, are sufficient for establishing that Applicant was in the possession of at least the disclosed embodiment of the claimed invention. Favorable reconsideration is requested.

### **35 U.S.C. § 112 Enablement Rejections**

Claims 1-24 were rejected under §112, first paragraph, for allegedly failing to comply with the enablement requirement. Applicant previously noted that MPEP 2164.04 provides:

(1) The examiner has the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention. *In re Wright*, 999 F.2d 1557, 1562, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993);

(2) The Examiner must provide a reasonable explanation as to why the scope of protection provided by a claim is not adequately enabled by the disclosure;

(3) It is incumbent upon the Patent Office, whenever a rejection on this basis is made, to explain *why* it doubts the truth or accuracy of any statement in a supporting disclosure and to back up assertions of its own **with acceptable evidence or reasoning** that is inconsistent with the contested statement.

Otherwise, there would be no need for the applicant to go to the trouble and

expense of supporting his presumptively accurate disclosure." *In re Marzocchi*, 439 F.2d at 224, 169 USPQ at 370. (bolding added); and

(4) To object to a specification on the grounds that the disclosure is not enabling with respect to the scope of a claim sought to be patented, **the examiner must provide evidence or technical reasoning substantiating those doubts.**

(see also USPTO Examiner Training Materials for § 112 at

<http://www.uspto.gov/web/offices/pac/dapp/1pecba.htm>)(bolding added)

In response to the Office's request for test data (28 February 2008 Office Action), Applicant noted that the application itself contains test data (see e.g., the Examples on page 13), and noted that MPEP 2164.02 provides that a "single working example in the specification for a claimed invention is enough to preclude a rejection which states that nothing is enabled since at least that embodiment would be enabled". Applicant further noted that the specification as filed:

(1) Discloses that precipitator function is optimized at SO<sub>3</sub> levels at 15 to 20 parts per million (ppm) in flue gas (page 2, lines 15-18);

(2) Discloses seven methods of increasing the residence time for actively adjusting the reducing environment such that SO<sub>3</sub> is reduced to SO<sub>2</sub>, and discloses four methods of increasing the reducing potential in the flue gas for actively adjusting the reducing environment such that SO<sub>3</sub> is reduced to SO<sub>2</sub> (page 9, lines 5-17); and

(3) Contains Examples showing (i) acceptable ratios of SO<sub>3</sub> to SO<sub>2</sub> at different staging depths to achieve embodiments of the present invention and (ii) % SO<sub>3</sub> reduction achievable thereby.

Applicant wishes to clarify that the seven methods of increasing the residence time and the four methods of increasing the reducing potential in the flue gas for actively adjusting the reducing environment are all clearly set forth as being relative to the operating conditions at a given plant. As such, and as previously noted, efficacious values would be readily apparent based on the existing operating conditions at a given plant.

Applicant previously requested that if the Office disagrees, it explain in more detail so that Applicant could better respond to the Examiner's concerns. As noted above, when "object[ing] to a specification on the grounds that the disclosure is not enabling with respect to the scope of a claim sought to be patented, **the examiner must provide evidence or technical reasoning substantiating those doubts.**" Applicant was unable to locate any discussion based on "evidence or technical reasoning" why adjustment relative to existing operation conditions at a given plant would require undue experimentation.

In its *Response to Arguments* section (15 October 2008), the Office states that "the test data on page 13 refer to the results that can be achieved and the effects, which are not enabling as it merely informs one of the end state and not how it was achieved". In response to this contention, Applicant respectfully directs the Office's attention to Applicant's response to the detailed discussion of the actual reduction to practice noted above, discussing macro-adjusting parameters used. Reconsideration is respectfully requested.

#### **Advisory Action Regarding Enablement**

In its Advisory Action of 4 March 2009, the Office notes that the existence of working examples is but one factor in making a determination of enablement. The Office also recognizes that the specification as filed lists parameters to increase the residence time and increase the reducing potential in the flue gas. The Office then expresses its concerns that the specification "provides few details as to what values these parameters should be in order to enable the invention". As noted above, the disclosed parameters can be adjusted relative to existing operating conditions at a given plant, thus making actual values readily ascertainable to one of ordinary skill in the art. As such, Applicant respectfully believes that any concerns the Office has regarding a particular parameter at a particular plant should be addressed. Again, if the Office disagrees, Applicant requests clarification as to why adjustment relative to existing operation conditions at a given plant would require undue experimentation.

### 35 U.S.C. §103

#### Claims 9-16

The Office maintains its 35 U.S.C. §103 rejections of Claims 9-16 in light of the combination of Kindig, Wright, and Carver. Applicant requests favorable reconsideration for the reasons below.

The Office contends that Kindig discloses “adjusting the reducing environment such that SO<sub>3</sub> is reduced to SO<sub>2</sub> to achieve a desirable level of SO<sub>3</sub> (col. 13, lines 8-23, SO<sub>3</sub> and SO<sub>2</sub> are inherently produced during combustion, and reduction is inherently occurring).” Applicant wishes to clarify that, in contrast to the instantly claimed invention, Kindig is directed to increasing the “reaction of sulfur dioxide to sulfur trioxide” (see, for example, the Abstract showing using specific coal, a sulfur sorbent, a sulfation propoter, and a catalyst for the reaction of sulfur dioxide to sulfur trioxide”). Indeed, the portion of Kindig cited by the Office is clearly directed to using a “catalyst for the reaction of sulfur dioxide to sulfur trioxide”. Kindig discloses that “increased levels of sulfur trioxide are present in the combustion gas stream and are present for reaction with magnesium oxide to form magnesium sulfate”. As such, Kindig discloses using a catalyst (not a redox adjustment in the reducing environment) to increase the production of the sulfur trioxide (not reduce SO<sub>3</sub> to SO<sub>2</sub> to effectuate an overall decrease in SO<sub>3</sub> for optimizing precipitator function).

Based on these facts, Applicant believes the Office’s rejection is improper for at least two reasons:

- (1) it fails to produce the claimed limitations; and
- (2) it changes the principle of Kindig’s operation from a catalyst based system designed to increase SO<sub>3</sub> for increased reaction with magnesium oxide (MPEP 2143.01 provides that “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious”).

Regarding Wright, the Office contends that Wright is directed to “optimizing precipitator function (col. 1, lines 27-61) for the purpose of meeting clean air requirements.” It is important to recognize, however, that Wright is apparently directed to problems associated with the burning of **low-sulfur coal**, e.g., that the burning of low-sulfur foal produces a flue gas with high resistivity, which negatively effects precipitator function (col. 1, lines 33-38). Wright discloses

that “[o]ne solution to this problem has been to condition the boiler flue gas prior to its entrance into the electrostatic precipitator by the use of a **conditioning agent** to reduce the resistivity of the entrained particles within the boiler flue gas” (col. 1, lines 54-58). Wright does disclose that one of the known conditioning agents is sulfur trioxide (col. 1, line 61), and discloses that external sulfur flow to the flue gas can be controlled as needed to achieve the desired opacity of the stack effluent (col. 4, line 61- col. 5, line 12). Wright’s preferred embodiment similarly makes clear that Wright’s sulfur trioxide is produced by converting injected sulfur to sulfur dioxide with a sulfur burner, and the converting sulfur dioxide to sulfur trioxide with a sulfur dioxide conversion unit (col. 7, line 64 – col. 8, line 3). Thus Wright, similarly to Kindig, fails to disclose or suggest *actively adjusting the reducing environment such that SO<sub>3</sub> is reduced to SO<sub>2</sub> to effectuate an overall decrease in SO<sub>3</sub> concentration and achieve a desirable level of SO<sub>3</sub> for optimizing precipitator function*. Wright is injecting a chemical to increase the SO<sub>3</sub> concentration for low-sulfur fuels.

Regarding Carver, the Office contends that:

Carver teaches actively adjusting, [to] effectuate an overall decrease in SO<sub>3</sub> concentration (abstract, figs.) for the purpose of meeting environmental regulations. It would have been obvious to one of ordinary skill in the art to modify Kindig by including actively adjusting, [to] effectuate an overall decrease in SO<sub>3</sub> concentration as taught by Carver for the purpose of meeting environmental regulations.

Regardless of this contention, still missing is any disclosure or suggestion of a method where *SO<sub>3</sub> is reduced to SO<sub>2</sub> to effectuate an overall decrease in SO<sub>3</sub> concentration and achieve a desirable level of SO<sub>3</sub> for optimizing precipitator function*. Additionally, as emphasized by the Office, Carver is directed to lowering SO<sub>x</sub> emissions (i.e. from the stack) “using a process which utilizes a sorbent to adsorb the sulfur and a staged air process which keeps the peak combustion temperatures relatively low compared to state of the art processes” (col. 12, lines 30-35). Applicant was unable to locate any disclosure or suggestion in Carver for altering SO<sub>3</sub>/SO<sub>2</sub> levels or ratios prior to emission for a stated purpose. Applicant respectfully submits that Carver does not provide the claimed limitations and cannot provide the requisite motivation. To the extent Kindig adjusts SO<sub>3</sub>/SO<sub>2</sub> levels pre-emission, Applicant respectfully submits that is a different way (via catalyst) for a different purpose (increasing the reaction of sulfur dioxide to sulfur trioxide). For at least these reason, favorable reconsideration is requested.

In its Advisory Action of 4 March 2009, the Office summarizes Applicant's concerns regarding Kindig stating "applicant argues that the rejection is improper because it fails to produce the claimed limitations and changes the principle of Kindig's operation" The Office then states that "one cannot show nonobviousness by attacking references individually where rejections are based on combinations of references". Applicant respectfully submits that, as noted above, the Office's combination of references simply relies on different techniques (e.g., catalysts and sulfur injection) that do not disclose the claimed limitations. Further, as noted above, Applicant believes MPEP 2143.01 makes clear that motivation for modifying Kindig in the manner claimed is lacking.

If the Office maintains the current rejection, Applicant respectfully requests that it address each of these shortcomings with specificity, including MPEP 2143.01, so that Applicant can better respond.

Applicant notes that because Applicant has addressed certain comments of the Office does not mean that Applicant concedes other comments of the Office. Further, the fact that Applicant has made arguments for the patentability of some claims does not mean there are not other good reasons for the patentability of those or other claims.

#### **Claims 1-3, 8-11, 16-19 and 24**

The Office maintains its 35 U.S.C. §103 rejections of Claims 1-3, 8, 9-11, 16, 17-19 and 24 as being unpatentable over Carver in view of Fan and Wright. Applicant requests favorable reconsideration for the reasons above. In particular, Fan is unable to provide the above mentioned shortcomings in Wright and Carver, including: (1) providing missing limitations, and (2) providing a requisite motivation to modify the references in any way that would produce the claimed invention.

Applicant notes that because Applicant has addressed certain comments of the Office does not mean that Applicant concedes other comments of the Office. Further, the fact that Applicant has made arguments for the patentability of some claims does not mean there are not other good reasons for the patentability of those or other claims.

### **Commonly Owned, Co-pending Applications**

Applicant also wishes update the Office on the status of two co-pending and commonly owned applications, United States Patent Application No. 10/797,513, and United States Application No. 10/798,088. These applications and the current application share a common priority claim to Provisional Application No. 60/544,724, filed 14 February 2004. These applications were both previously disclosed by supplemental IDS. Their common priority is set forth in each specification. In the interest of full disclosure, Applicant would also like to update the Office on the status of their prosecution.

Regarding Application No. 10/798,088, a Notice of Allowance was recently received. A copy of that Notice of Allowance is attached.


Regarding Application No. 10/797,513, no claims are yet allowed. A copy of the most recent Office Action is attached.

Consideration is requested.

### **Conclusion**

By this amendment, Applicant submits that he has placed the case in condition for immediate allowance and such action is respectfully requested. However, if any issue remains unresolved, Applicant's attorney would welcome the opportunity for a telephone interview to expedite allowance and issue.

Respectfully submitted,



R. Kody Jones  
Registration No. 57,237  
MacCord Mason PLLC  
P. O. Box 2974  
Greensboro, NC 27402  
(336) 273-4422

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